

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

DRY HYDRANT

(Each)

CODE 432

DEFINITION

A non-pressurized permanent pipe assembly system installed into water source that permits the withdrawal of water by suction.

PURPOSE

To provide all-weather access to an available water source for fire suppression.

CONDITIONS WHERE PRACTICE APPLIES

Where a dependable source of water is available, where transport vehicles can access the site, and where a source of water is needed for fire suppression.

CRITERIA

Laws, rules, and regulations. This practice shall conform to all federal, state, and local laws, rules, and regulations. Laws, rules, and regulations of particular concern include those involving water rights, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

The landowner is responsible for securing necessary permits, complying with all laws and regulations, and meeting legal requirements applicable to the installation and operation and maintenance of the dry hydrant and associated structures

Site conditions. Site conditions shall be such that an all-weather vehicle access is available to the dry hydrant or can be developed. The dry hydrant shall be reasonably close to the water source to minimize the length of suction line. This should be determined in conjunction with local fire officials. Special care and

maintenance will be required when debris and fine soil particles are part of the streambed.

Water requirement. The quantity to be considered available to a dry hydrant is the minimum available (at not over 15 feet total static lift) during a drought. A minimum of 30,000 gallons (1.1 acre-inches) of pumpable impoundment water or a minimum pump flow rate of 250 gpm without interruption for 2 hours is considered a dependable water supply.

Location. The proposed location of the dry hydrant, the access (ingress and egress), and the topography shall be reviewed by and have the concurrence of the landowner, fire department personnel, and a representative of the highway or county road department or others who will be required to build, service, and maintain the access roads and the area adjacent to the dry hydrant.

Written permission should be developed in cooperation with the municipal, town, or county attorney. A letter of approval to use the site including water use, an agreement on ingress and/or egress, and allowed fire department usage and maintenance will be provided by the landowner prior to construction.

The location map showing the exact site of the dry hydrant and the vehicle access (ingress and egress) shall be part of the approved conservation plan. A copy of the location map shall be furnished to the local fire department with a copy to the landowner.

The fire truck connection shall be within 10 feet of the edge of an all-weather access road. The all-weather access road and fire truck pumper connection shall be higher than the auxiliary spillway elevation if installed in a constructed impoundment.

Water supply. The adequacy of the water supply from impoundments shall be determined in accordance with appropriate local criteria. The Reservoir Operations (RESOP) computer program, Technical Release No. 19, or similar procedure can be used to determine the water supply contained by earthen construction or water impounding embankments. The adequacy of the stream flow source can be determined from regional analysis of stream gage data.

Pipe. The pipe material may be iron, steel, or plastic. Plastic pipe shall be UV-resistant or otherwise protected from ultraviolet rays. No more than two 90-degree elbows shall be used in the entire pipe system. Pipe shall have a nominal diameter of 6 inches or larger. The pipe shall be fitted with intake screen or strainer and standard fire truck hose adapters for quick connect/release operations acceptable to the local fire department.

The depth at which the pipe is installed shall be below the frost-free depth for the area.

The pipe materials must be compatible in size and designation with the manufactured hydrant head. Polyvinyl chloride (PVC) bell and spigot pipe with rubber gasket seals shall not be used. The minimum plastic pipe material shall be PVC Schedule 40 or SDR 26. The maximum fill height over the top of the pipe shall be 10.5 feet.

The standard thermoplastic pipe designation code for PVC pipe shall be 1120 or 1220 and for acrylonitrile-butadiene-styrene (ABS) pipe shall be 1316 or 2112. Plastic pipe shall conform to one of the following American Society for Testing and Materials (ASTM) specifications:

- D 1785, Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120
- D 2241, Polyvinyl Chloride (PVC) Pressure Rated Pipe (SDR Series)
- D 2665, Polyvinyl Chloride (PVC) Plastic Drain, Waste, and Vent Pipe Fittings
- D 1527, Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80
- D 2282, Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, (SDR-PR)

Steel pipe shall meet the requirements specified in ASTM A 53 or in American Water Works Association (AWWA) C 200.

Pressure pipe fittings shall conform to the requirements of the following ASTM specifications:

- D 2464, Threaded Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80
- D 2466, Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40
- D 2467, Socket-Type Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80
- D 2468, Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 40
- D 2672, Joints for IPS PVC Pipe Using Solvent Cement

Solvents for solvent-welded pipe joints shall conform to the following ASTM specifications:

- D 2235, Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings
- D 2564, Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe Systems
- D 2855, Making Solvent-Cemented Joints with Polyvinyl Chloride (PVC) Pipe and Fittings.

Pipe intake. The pipe intake depth shall be calculated from the design water elevation plus pipe diameter plus 2 feet. The intake screen should have a minimum opening of 4 times the pipe cross-sectional area.

A dry hydrant installation shall provide for a positive slope toward the water source. In pits or impoundments, the intake screen or strainer shall be supported and secured at least 2 feet above the pool bottom. The intake shall be at least 4 feet beyond the earth slope.

To avoid a vortex or whirlpool during pumping, the top of the inlet pipe shall be at least 2 feet below the design water level unless a special design is prepared to prevent vortex.

Pump lift. The top of the fire truck pumping connection or centerline of pump (whichever is higher) shall be no more than 15 feet in elevation above the bottom of the fire protection pool or stream surface during drought conditions.

The fire truck connection shall be approximately 24 inches above the ground surface but never higher than the intake of the using fire truck.

The total lift (pumping head) shall not exceed 20 feet when all losses are totaled. Pumping head for each site shall include head loss from screen or strainer, elbows, line friction, elevation (static head), and hard rubber or flexible suction hose to the fire truck.

Dry hydrant. Dry barrel (conventional) hydrants may not be used due to excess suction loss and the necessity that they be absolutely airtight.

A recessed hydrant (below ground-level connection) may be specified for use in areas with special needs such as in a high vandalism area or for low profile and esthetic needs. It is also referred to as a flush-mount hydrant and does not require the 24-inch riser. It may be used with the 45-degree or straight dry hydrant head assembly.

Dry hydrant head. The hydrant sleeve shall be made of bronze; brass; aluminum alloy; or other durable, non-corrosive metal. The sleeve must be permanently affixed inside a PVC head using epoxy adhesive and stainless steel bolts.

The hydrant head shall be able to accept a 6-inch NHT (American National Fire Hose Thread) connection to provide maximum supply. The hydrant (6-inch) head shall conform to ASTM D 2466.

All hydrants shall contain a removable head strainer and stainless steel snap ring that can be removed without special tools. The strainer shall be conical in shape to maximize straining area. All hydrants shall use a rubber "O" ring between the threaded sleeve and PVC head.

Dry hydrant cap. The cap shall be of snap-on/snap-off design and removable without special tools. It shall be joined with a steel cable or chain and be permanently attached to the dry hydrant head. The cap shall be hard plastic or of the same metal as the NHT connection for maximum corrosion resistance.

Strainer. The strainer shall be fabricated from PVC material compatible with the pipe. Individual inlet holes shall not exceed 3/8 inch diameter. All components, including pins, shall be non-corrosive. Manufactured well screens shall be corrosion-resistant. Screens and strainers shall have a minimum open area of 4 times the pipe cross sectional area.

A strainer may be formed by drilling 1/4-inch to 3/8-inch diameter holes with a minimum of 1

hole diameter between the holes in PVC pipe. Drill holes shall be deburred and the pipe cleaned before putting the strainer into service. The screens or strainers shall be capped with a removable end cap.

End cap. The end cap must be easily removed without special tools. Perforations are recommended in the end cap to improve flow conditions into the strainer and for jetting action for silt cleanout.

Materials. All materials shall meet or exceed the minimum requirements for materials described in the various sections of this standard.

Access. Vehicle access to and from the dry hydrant shall be provided for fire truck and pumper units. Access shall have an all-weather surface, be well drained, and be at least 12 feet wide for ease of movement by personnel and equipment during an emergency. When local road traffic may be involved, an all-weather road surface adjacent to the dry hydrant and completely off the public road is recommended for the safety of the emergency personnel and the public.

Protection. After the dry hydrant installation, the site shall be graded for surface drainage and vegetated or otherwise protected from erosion. Seedbed preparation, seeding, fertilizing, and mulching shall comply with Conservation Practice Standard 342, Critical Area Planting.

CONSIDERATIONS

Consider the effect of the use of the dry hydrant on upstream and downstream water quantity. Impacts on surface water quantity of an existing water source may be adversely affected by a temporary lowering of the water level. Impact of ground water quality and quantity will be negligible. Installation should be less than 1 day, and impacts should be minimal.

Consider the sediment production caused by erosion during construction.

Consider the possible effects on surface and ground water of spilled fuels and lubricants by fire trucks using the dry hydrant.

Locate and notify all overhead and underground utility companies prior to excavation and consider utilities during the planning of the access.

Dry hydrants shall be placed far enough away from the edge of the water or steep banks to prevent hazardous situations during use and maintenance.

Shape pond banks by the intake to 3 horizontal to 1 vertical (3:1) slopes or flatter to prevent undercutting.

Any excavation along streams or ponds has a high potential for trench cave-ins. Most of these excavations will have water in the trench, creating unstable trench walls. If workers must enter the trench, Occupational Safety and Health Administration (OSHA) 1926, Excavation Regulations, shall be followed.

The dry hydrant should be thoroughly and completely tested at the pumping pressures for pressure strength and leakage while uncovered or only partly backfilled.

Dry hydrants are intended to give local fire departments water supplies to fight fires. The end user is the local fire department; therefore, it is necessary to involve them in the planning stages of these facilities. A pumping rate goal of 250 gallons per minute is recommended to meet anticipated future needs.

Sediment, debris, and low water may influence the value of intakes placed in streams. Installations in streams should be treated as a special design consideration.

PLANS AND SPECIFICATIONS

Plans and specifications for installing dry hydrants shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. Required permits shall be obtained prior to initiating any work.

OPERATION AND MAINTENANCE

Keeping the site clear of obstructions and regular mowing of the dry hydrant access area will be required to keep the area readily available for emergency use.

Pumper testing of the dry hydrant shall be done at least annually to verify site usability. This test shall include back flushing, followed by a pumper test at the maximum designed flow rate. Careful attention should be given to silt, debris, aquatic growth, or other interference that may limit the full operation of the dry hydrant.

Checks of the intake screen should be made once every 5 years to identify any sediment build-up and to provide information for a clean-out operation or for aquatic growth control needs. The hydrant should be back-flushed each spring and fall to remove any silt or debris that may have accumulated on the screen.